

What is claimed is:

1. A telecentric lens system having an aperture stop and a telecentric pupil, said system comprising in order from its long conjugate side to its short conjugate side:

- (a) a first lens unit which has a negative power and comprises a negative lens element whose strongest surface is convex to the long conjugate side of the system; 5
 - (b) a second lens unit which is of weak optical power and comprises two meniscus elements whose concave surfaces face each other, the system's aperture stop being located between the meniscus elements and each meniscus element having at least one aspheric surface; and 10
 - (c) a third lens unit which has a positive power and comprises means for correcting the chromatic aberrations of the system, said third lens unit forming the system's telecentric pupil by imaging the aperture stop. 15
2. The telecentric lens system of claim 1 wherein the negative lens element of the first lens unit is meniscus shaped. 20
3. The telecentric lens system of claim 1 wherein the negative lens element of the first lens unit is located at the long conjugate end of the lens system. 25
4. The telecentric lens system of claim 1 wherein the negative lens element of the first lens unit is composed of a low dispersion material. 30
5. The telecentric lens system of claim 1 wherein the first lens unit includes at least one aspheric surface. 35
6. The telecentric lens system of claim 1 wherein the first lens unit contains only negative lens elements. 40
7. The telecentric lens system of claim 1 wherein the second lens unit comprises a positive lens element associated with the meniscus element nearest the long conjugate side of the system and located on the long conjugate side of that meniscus element. 45
8. The telecentric lens system of claim 7 wherein said positive lens element is composed of a high dispersion material. 50
9. The telecentric lens system of claim 7 wherein said positive lens element is a cemented doublet. 55
10. The telecentric lens system of claim 7 wherein said positive lens element has at least one aspheric surface. 60
11. The telecentric lens system of claim 1 wherein the second lens unit comprises a color correcting doublet. 65

12. The telecentric lens system of claim 11 wherein the color correcting doublet is located in the vicinity of the lens system aperture stop so that the doublet corrects axial color without significantly correcting lateral color.

5 13. The telecentric lens system of claim 1 wherein the color correcting means of the third lens unit comprises a color correcting doublet.

14. The telecentric lens system of claim 1 wherein the color correcting means of the third lens unit comprises a
10 doublet which consists of a positive lens element composed of a first low dispersion material and a negative lens element composed of a second low dispersion material.

15. The telecentric lens system of claim 1 wherein the third lens unit includes at least one aspheric surface.

16. The telecentric lens system of claim 1 wherein the third lens unit provides the majority of the positive power of the lens system.

17. A projection television system comprising a pixelized
20 panel, a screen, and a lens system for forming an image of the pixelized panel on the screen, said lens system having an aperture stop and a telecentric pupil, and the distance between the aperture stop and the pixelized panel being at least about 2.5 times the lens system's focal length, wherein
25 the lens system comprises, in order from its long conjugate side to its short conjugate side:

(a) first lens unit which has a negative power and comprises a negative lens element whose strongest surface is convex to the long conjugate side of the system;

30 (b) a second lens unit which is of weak optical power and comprises two meniscus elements whose concave surfaces face each other, the system's aperture stop being located between the meniscus elements and each
35 meniscus element having at least one aspheric surface; and

(c) third lens unit which has a positive power and comprises means for correcting the chromatic aberrations of the system, said third lens unit forming the system's
40 telecentric pupil by imaging the aperture stop.

18. The projection television system of claim 17 wherein the second lens unit comprises means for correcting the chromatic aberrations of the lens system.

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19. A projection lens system comprising a pixelized panel, a screen, and a projection lens for forming an image of the pixelized panel on the screen, said projection lens comprising a lens element composed of a material having an abnormal partial dispersion.

20. The projection lens system of Claim 19 wherein said lens element reduces the secondary lateral color of the projection lens.

21. The projection lens system of Claim 19 wherein the lateral color at the pixelized panel over the visual spectrum is less than about a diagonal of a pixel.

22. The projection lens system of Claim 19 wherein the lateral color at the pixelized panel over the visual spectrum is less than about one-half the diagonal of a pixel.

23. The projection lens system of Claim 19 wherein the projection lens has a short conjugate side in the direction of the pixelized panel and is telecentric on said short conjugate side.

24. The projection lens system of Claim 19 wherein the projection lens further comprises a first lens element nearest to the screen and a second lens element nearest to the pixelized panel, each of said lens elements comprising an aspheric surface.

25. The projection lens system of Claim 24 wherein the first lens element has a negative power.

26. The projection lens system of Claim 25 wherein the first lens element is meniscus-shaped.

27. The projection lens system of Claim 25 wherein the strongest surface of the first lens element is convex to the screen.

28. The projection lens system of Claim 19 wherein the projection lens further comprises a negative lens element and a positive lens element, the dispersion of the negative lens element being less than the dispersion of the positive lens element.

29. The projection lens system of Claim 19 wherein the projection lens further comprises a negative lens element and a positive lens element, the dispersion of the negative lens element being greater than the dispersion of the positive lens element.

30. The projection lens system of Claim 19 wherein the projection lens has an aperture stop and the distance between the aperture stop and the pixelized panel is at least about 2.5 times the projection lens' focal length.

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31. A projection lens system comprising a pixelized panel, a screen, and a projection lens for forming an image of the pixelized panel on the screen, said projection lens comprising:

- (a) a first lens unit which has a negative power and comprises a negative lens element,
- (b) a second lens unit which is of weak optical power, and
- (c) a third lens unit which has a positive power, said third lens unit comprising color correcting means for correcting the chromatic aberrations of the lens system, said color correcting means comprising a material having an abnormal partial dispersion.

32. The projection lens system of Claim 31 wherein said color correcting means reduces the secondary lateral color of the projection lens.

33. The projection lens system of Claim 31 wherein the lateral color at the pixelized panel over the visual spectrum is less than about a diagonal of a pixel.

34. The projection lens system of Claim 31 wherein the lateral color at the pixelized panel over the visual spectrum is less than about one-half the diagonal of a pixel.

35. The projection lens system of Claim 31 wherein the projection lens has a short conjugate side in the direction of the pixelized panel and is telecentric on said short conjugate side.

36. The projection lens system of Claim 31 wherein the strongest surface of the negative lens element is convex to the screen.

37. The projection lens system of Claim 31 wherein the negative lens element is meniscus-shaped.

38. The projection lens system of Claim 31 wherein the negative lens element is located at the screen end of the projection lens.

39. The projection lens system of Claim 31 wherein the negative lens element is composed of a low dispersion material.

40. The projection lens system of Claim 31 wherein the first lens unit comprises an aspheric surface.

41. The projection lens system of Claim 31 wherein the first lens unit contains only negative lens elements.

42. The projection lens system of Claim 31 wherein the third lens unit comprises an aspheric surface.

43. The projection lens system of Claim 31 wherein the projection lens has an aperture stop and the distance between the aperture stop and the pixelized panel is at least about 2.5 times the projection lens' focal length.

44. A projection lens for forming an image of an object which (a) has a short conjugate side and a long conjugate side, (b) is telecentric on said short conjugate side, and (c) comprises a lens element composed of a material having an abnormal partial dispersion.

45. The projection lens of Claim 44 wherein said lens element reduces the secondary lateral color of the projection lens.

46. The projection lens of Claim 44 wherein the projection lens further comprises a first lens element at the long conjugate side and a second lens element at the short conjugate side, each of said lens elements comprising an aspheric surface.

47. The projection lens of Claim 46 wherein the first lens element has a negative power.

48. The projection lens of Claim 47 wherein the first lens element is meniscus-shaped.

49. The projection lens system of Claim 47 wherein the strongest surface of the first lens element is convex to the long conjugate.

50. The projection lens of Claim 44 wherein the lens further comprises a negative lens element and a positive lens element, the dispersion of the negative lens element being less than the dispersion of the positive lens element.

51. The projection lens of Claim 44 wherein the lens further comprises a negative lens element and a positive lens element, the dispersion of the negative lens element being greater than the dispersion of the positive lens element.

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52. A projection lens for forming an image of an object which (a) has a short conjugate side and a long conjugate side, (b) is telecentric on said short conjugate side, and (c) comprises:

- (i) a first lens unit which has a negative power and comprises a negative lens element,
- (ii) a second lens unit which is of weak optical power, and
- (iii) a third lens unit which has a positive power, said third lens unit comprising color correcting means for correcting the chromatic aberrations of the lens system, said color correcting means comprising a material having an abnormal partial dispersion.

53. The projection lens of Claim 52 wherein said color correcting means reduces the secondary lateral color of the lens.

54. The projection lens of Claim 52 wherein the strongest surface of the negative lens element is convex to the long conjugate.

55. The projection lens of Claim 52 wherein the negative lens element is meniscus-shaped.

56. The projection lens of Claim 52 wherein the negative lens element is located at the long conjugate end of the lens.

57. The projection lens system of Claim 52 wherein the negative lens element is composed of a low dispersion material.

58. The projection lens system of Claim 52 wherein the first lens unit comprises an aspheric surface.

59. The projection lens system of Claim 52 wherein the first lens unit contains only negative lens elements.

60. The projection lens system of Claim 52 wherein the third lens unit comprises an aspheric surface.